Patent Claims

1. A particle composite made up of carrier particles of a mean diameter of less than 5 μm, which are enveloped by a layer made of oxidic material having an irregular surface, to which particles made of active material having a mean diameter of less than 1 μm are applied.

2. The particle composite as recited in Claim 1,
characterized in that the carrier particles are carbon, preferably thermal carbon blacks or flame carbon blacks, or oxidic carriers, preferably precipitated and/or pyrogenic silicic acids.

3. The particle composite as recited in Claim 1,
characterized in that the layer made of oxide material contains oxides of silicon, aluminum, alkaline earth elements, alkaline elements, or combinations thereof, which are derived through thermal decomposition of precursors having silicon, aluminum, alkaline earth elements, or alkaline elements containing at least one organic residue.

4. The particle composite as recited in Claim 3,
characterized in that the precursor containing at least one organic residue is a silicon-organic compound, in particular an alkyl silane, a fluoroalkyl silane, and/or an alkyl silicon chloride.

5. The particle composite as recited in Claim 1,
characterized in that the active material is a metal, a metal alloy, a semiconductor, and/or their compounds, in particular chalcogenides, nitrides, or carbides of metals.

6. The particle composite as recited in Claim 5,
characterized in that the metals or semiconductors are selected from the group including magnesium, calcium, barium, titanium, manganese, iron, copper, zinc, silver, gold, platinum, zirconium, yttrium, aluminum, silicon, and tin.

7. The particle composite as recited in Claim 6,
characterized in that the chalcogenide is an oxide, preferably a zinc oxide.

8. The particle composite as recited in Claim 1,
characterized in that the carrier particle has a mean diameter of 0.1 μm to 1.0 μm (D_{50}) and the particles made of active material have a mean diameter of 1 nm to 1000 nm (D_{50}), and the ratio of the mean diameter of the carrier particles to the mean diameter of the particles made of active material is less than 1:0.5, preferably between 1:0.01 and 1:0.1.

9. A method for producing particle composites as recited in Claim 1 comprising the following measures:
   i) producing a layer of a precursor substance having silicon, aluminum, alkaline earth elements, and/or alkaline elements, containing at least one organic residue, on carrier particles with a mean diameter of less than 5 μm,
   ii) thermally decomposing the precursor substance on the coated carrier particles to produce a layer, which envelops the carrier particles, made of oxidic material having an irregular surface, and
   iii) applying particles made of active material having a mean diameter of less than 1 μm or precursors of these particles to the surface of the coated carrier particles,
   iv) if precursors of particles made of active material are applied to the surface of the coated carrier particles, the active particles being produced through thermal treatment of the particle composite.

10. A method for producing particle composites as recited in Claim 1 comprising the following measures:
   i) producing a layer of a precursor substance having silicon, aluminum, alkaline earth elements, and/or alkaline elements, containing at least one organic residue, on carrier particles with a mean diameter of less than 5 μm,

v) applying particles made of active material having a mean diameter of less than 1 μm or precursors of these particles to the surface of the carrier particles coated with precursor substance, and

vi) thermally decomposing the precursor substance on the coated carrier particles to produce a layer, which envelops the carrier particles, made of oxidic material having an irregular surface, and possibly to produce particles made of active material having a mean diameter of less than 1 μm from the precursors of these particles.

11. The method as recited in one of Claims 9 or 10,
characterized in that the impregnation in step i) is performed through contact of the carrier particles with a solution or dispersion containing the precursor substance.

12. The method as recited in one of Claims 9 or 10,
characterized in that the impregnation in step i) is performed by making a paste of the carrier particles with a solution or dispersion containing the precursor substance.

13. The method as recited in one of Claims 9 or 10,
characterized in that the temperatures and the treatment duration during the thermal decomposition in step ii) or vi) are selected in such way that the surface area of the enveloped carrier particle determined by the BET method has increased by at least 10%, preferably at least 25%, after the thermal treatment.

14. The method as recited in one of Claims 9 or 10,
characterized in that the application of active particles or their precursors to the surface in step iii) or in step v) is performed through contact of the coated carrier particles with a solution or dispersion containing the active particles or their precursor substance.

15. Use of the particle composite as recited in Claim 1 as a filler and/or as a stabilizer in polymers.

16. Use of the particle composite as recited in Claim 1 as a catalyst for chemical reactions.

17. The use as recited in Claim 15,
characterized in that the polymer is an elastomer and the active material is zinc oxide.